Study of Rocks under the Microscope," by Mr. Alfred Harker, F.R.S. The book has been revised, new figures have been added, and a few old ones have been withdrawn.

THE U.S. Department of Agriculture has issued, at the request of librarians and others interested in entomology, a complete list of the publications of the Bureau of Entomology and those of the Department of Agriculture in general bearing on the same subject, and published by members of the Bureau or under its auspices. The list has been compiled by the librarian, Miss Mabel Colcord.

A SECOND edition of "An Elementary Course of Practical Zoology," by the late Prof. T. Jeffery Parker and Prof. W. N. Parker, has been published by Messrs. Macmillan and Co., Ltd. The first edition was reviewed at length in the issue of NATURE for April 12, 1900 (vol. lxi., p. 559). In the present edition some parts have been slightly extended, and various modifications made throughout; in addition, short accounts have been introduced of Monocystis, Nereis, and Obelia, and several new figures added.

THE Carnegie Institution of Washington has published an "Index of Economic Material in Documents of the States of the United States: New York, 1789–1904." The index has been compiled by Mr. A. R. Hasse, of the New York Public Library, for the department of economics and sociology of the institution. The index runs to 553 large pages, and deals only with the printed reports of administrative officers, legislative committees, and special commissions of the States, and with governors' messages for the period since 1789.

OUR ASTRONOMICAL COLUMN.

COMET 1907*d*.—No. 4234 of the *Astronomische Nachrichten* (p. 159, February 22) contains Herr Kritzinger's continuation of his ephemeris for Daniel's comet. At present the calculated magnitude of this object is about 10·8, and the comet is situated about 2° north of μ Virginis.

OBSERVATORY MAP OF THE MOON.—From Mr. Porthouse, of 6 Bates Street, Birch Lane, Longsight, Manchester, we have received a copy of his recently published map of the moon. This map is printed on a circle of 12 inches diameter, the different formations being shown very clearly in outline. At the side of the sheet is a printed list of the formations, with reference numbers and the diameters according to Neison. The map can be read easily in the dim light of the observatory, and can be obtained from the publisher for eightpence, post free.

THE RECENT MAXIMUM OF MIRA CETI.—From forty-one observations of Mira, made with an 8-inch telescope, a pair of field-glasses, and the naked eye, and extending from September 8, 1907, to January 29, M. Félix de Roy found that the maximum brightness occurred on November 1, 1907, with a magnitude of 3·41. From October 29·5 to November 4·5 the brightness of the star apparently remained constant. A comparison with M. Roy's observations of the 1906–7 maximum shows the period of fluctuation to be 318·5 days, some thirteen days shorter than it is given by Guthnick from the discussion of the observations made during the last three centuries; other observers of the recent changes place the maximum at dates varying from October 30 to November 9.

According to Chandler's computations, a maximum of Mira Cygni was due to take place on April 4·5. On March 9 and 26, respectively, M. de Roy estimated the magnitudes of this object to be 6·60 and 5·88 (*Gazette astronomique*, No. 4, March 31).

SUN-SPOT OBSERVATIONS.—In No. 4237 of the *Astronomische Nachrichten* (p. 205, March 6), Herr T. Epstein compares the results of his sun-spot observations made during the years 1905, 1906, and 1907. The figures for the half-years show that the maximum daily frequency took place in the second semester of 1905, and the yearly values indicate a steady decrease during 1906 and 1907. The ratio of the number of groups in the northern to the number in the southern hemisphere was almost reversed during 1907, for whereas in 1906 it was 1·55 : 1, in 1907 it was 1 : 1·28.

MERIDIAN CIRCLE OBSERVATIONS OF PARALLAX STARS.—Lick Observatory Bulletin, No. 129, contains a list of forty-five stars which have been observed at the request of Dr. L. de Ball for use in his heliometer measures of parallax. The positions given are the results of 400 observations, made on twenty-five nights, by Prof. R. H. Tucker.

THE RECENT TOTAL SOLAR ECLIPSE.—From a note in No. 1, vol. ii., of the Journal of the Royal Astronomical Society (Canada), we learn that the Lick Observatory eclipse party arrived back at Mount Hamilton on January 25. Rain fell during a part of the total phase, but some good photographs were obtained, for although the instruments were wet, they worked perfectly.

A NEW EXPEDITION TO THE SOUTHERN HEMISPHERE.—With the object of extending Prof. Boss's fundamental catalogue work to the southern hemisphere, an expedition, under the direction of Prof. R. H. Tucker, of the Lick Observatory, is to be dispatched to either New Zealand, South America, or South Africa. The Carnegie Institution has offered to bear the expense of the proposed observatory, and it is expected that the work will take about three years to carry out. The large Pistor and Martins meridian circle of the Dudley Observatory (Albany, U.S.A.) will be employed for this work (Journal R.A.S., Canada, vol. ii., No. 1, p. 43).

THE HAMBURG OBSERVATORY.—Prof. Schorr's report of the Hamburg Observatory, for 1906, contains an account of the new buildings and instruments. The new observatory lies about 20 kilometres to the south-east of the present one, and is at an altitude of 40 metres above the Elbe. The buildings are in the shape of a T, and cover an area of 33,652 square metres. Among the new instruments is a Steinheil refractor of 60 cm. aperture and 9 m. focal length, to which is adapted a correcting lens for the purpose of photography, and a meridian circle of 19 cm. aperture and 2·3 m. focal length; the circles are of 74 cm. diameter, and are divided in 4′ intervals. Reports, in brief, of the 1905 and 1907 eclipse expeditions and of the variable-star observations and time-service are also given in the volume.

THE ZIEGLER POLAR EXPEDITION.[1]

IN the introduction Mr. Fiala gives a somewhat scanty historical account of the expedition, a footnote referring the reader for details to his popular narrative "Fighting the Polar Ice." One gathers that the expedition was equipped by Mr. W. Ziegler, of New York—who died before its return—and that the vessel which conveyed the expedition to its objective, Franz Josef Land, in 1903 was lost, the party being eventually rescued in 1905.

Mr. Ziegler had the sagacity to leave the choice of a scientific leader to the National Geographic Society, and its selection of Mr. Peters seems justified by the results. Mr. Peters was himself to have prepared the scientific results for press, but shortly after his return to America he was appointed to the magnetic survey ship of the Carnegie Institution, and his duties as editor devolved on Mr. J. A. Fleming. The magnetic instruments, a unifilar magnetometer and a dip circle, were loaned by the U.S. Coast and Geodetic Survey, and a programme was prepared by Dr. L. A. Bauer. Meteorological instruments were lent by the U.S. Weather Bureau and the U.S. Signal Corps, and the completeness of the records obtained probably owes a good deal to the fact that one of the members of the expedition, Mr. Francis Long, was a trained observer of the U.S. Weather Bureau.

[1] "The Ziegler Polar Expedition 1903–5," Anthony Fiala, Commander. Scientific Results obtained under the direction of William J. Peters. Edited by John A. Fleming. Pp. vii+630; with maps. (Washington, D.C. Published under the auspices of the National Geographic Society, 1907.)

The results appear under six sections:—magnetic, pp. 1–360; auroral, pp. 361–8; meteorological, pp. 369–488; tidal, pp. 489–596; astronomical, pp. 597–622; and map construction and survey work, pp. 623–630. The pocket at the end contains a map of the Polar regions down to latitude 65°, indicating the routes of the chief Polar expeditions, and two charts of Franz Josef Land, one of the whole archipelago and the other of the part surveyed by the Ziegler expedition.

The magnetic work consisted mainly of observations at Camp Abruzzi, Teplitz Bay (81° 47′·5 N. lat., 57° 59′ E. long.), from September 28, 1903, to July 1, 1904, and at Camp Ziegler, Alger Island (81° 21′·5 N. lat., 56° 5′ E. long.), from June 26 to July 30, 1905. Miscellaneous observations were also taken at Tromso, Archangel, Barents Sea, and *en route* from Teplitz Bay to Cape Flora. Teplitz Bay, in Rudolph Island, is in the extreme north of the group of islands forming Franz Josef Land; it was the station occupied by the Duke of the Abruzzi's Italian expedition in 1899–1900. Alger Island is towards the south of the group, while Cape Flora, in Northbrook Island (the site of the Jackson-Harmsworth expedition), is in the extreme south. Fig. 1 (from p. 604) shows the nature of the observatory at Teplitz Bay. Prefaced to the magnetic observations is a condensed narrative relating mainly to auroral appearances and observational details, but occasionally of more general interest, as the following extract from the February, 1904, record will show:—

"12 : 20 : 00 sky clear, no aurora; 12 : 22 : 56 bear trying to break into observatory; 12 : 23 : 20 aurora in south-east; 12 : 23 : 40 to 48 observer investigating outside to see if bear is gone." For some time after this incident the observer, following the example of the Nansen expedition, provided himself with a revolver, the presence of which is conscientiously recorded. Considering the absence of self-recording instruments, the magnetic results obtained are, thanks to Dr. Bauer's programme, remarkably extensive. Eye readings of the declination magnet were carried out, so far as the exigencies of the situation permitted, on the following plan. On one day each week readings were taken at two-minute intervals throughout the whole twenty-four hours; on a second day similar observations were made for eight hours, and on each of four other days for four hours. The observations on these last five days were so arranged as to cover all hours of the day; thus results were obtained in each week answering to observations at two-minute intervals for two complete days. Diurnal inequalities of declination were formed for each four-week period at Teplitz Bay, each hourly value being a mean from $4 \times 2 \times 30$, or 240, readings. These inequalities are analysed in Fourier series and illustrated by curves. During the nine months at Teplitz Bay, the range of the regular diurnal inequality varied from 107′·1 in June to 26′·3 in February–March. The mean of the ranges from the two four-week periods November 29 to December 26 and December 27 to January 23 was 36′·7. The existence of so large a range in the Arctic mid-winter is noteworthy. Throughout the whole time the general character of the diurnal variation was an easterly movement (of the north end of the magnet) from about 8 p.m. to 5 a.m. The return movement to the west was fairly continuous and rapid in summer, but in winter there was usually a secondary east and west movement in the afternoon. The greater rapidity of the movement during the day, so characteristic in temperate latitudes, seems not to exist at Teplitz Bay except at midsummer. The corresponding analytical feature is the relatively small amplitude of the twelve-hour Fourier wave. The diurnal inequality of declination observed at Alger Island in June–July, 1905, had a somewhat smaller range, but was generally similar to that observed at Teplitz Bay at the previous midsummer. A satisfactory feature in connection with the declination observations is the frequency and consistency of the determinations of the true bearing of the distant marks employed.

More than fifty absolute observations of horizontal force and more than sixty observations of inclination (with two needles) were made at Teplitz Bay; at Alger Island there were sixteen observations of horizontal force and eight of inclination.

In accordance with the experience of previous Arctic observers, it was found that whilst magnetic storms and aurora were generally associated together, this was not always the case. Declination observations happened, fortunately, to be taken on November 1, 1903, during part of the great magnetic storm then in progress. In the course of 1h. 48m. the declination changed by 17° 18′, or some thirty-two times the corresponding change at the Cheltenham Observatory (where the horizontal force is about three times that at Teplitz Bay). If the same proportion existed throughout the rest of the storm, the declination range at Teplitz Bay must have exceeded 50°.

The auroral data are mainly descriptive, and there is no attempt at trigonometrical observations or tabular details. There are, however, nineteen handsome plates, based on chalk sketches made by Mr. Fiala, illustrating a number of auroral types, especially the corona. Plates VII. and VIII. show banded structures having in some respects a somewhat striking resemblance to those produced artificially by Villard.[1]

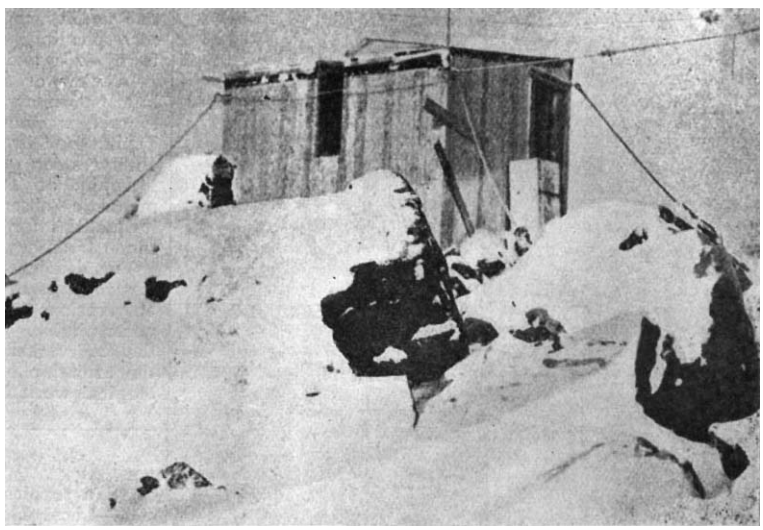

FIG. 1.—Exterior of Observatory at Teplitz Bay.

Of the meteorological observations, the longest series consists of hourly records of wind velocities from a Robinson cup anemometer at Teplitz Bay from September, 1903, to May, 1905. Allowing for possible differences between American and English estimates of wind velocity, we may safely characterise Teplitz Bay as a windy place. The average velocity for the whole period was 14·6 miles per hour. Monthly means varied from 8·2 in August, 1904, to 24·2 in February, 1905, and 24·6 in December, 1903. On four days the mean hourly velocity exceeded sixty; on December 28, 1903, the mean velocity was no less than 73·4 miles per hour. In winter, high gales were associated with a low barometer and a high temperature. Changes of temperature were notably large and rapid. Eye readings were taken thrice a day, at 8 a.m., noon, and 8 p.m., of barometric pressure, temperature (from ordinary and from maximum and minimum thermometers), precipitation, wind (velocity and direction), and cloud (amount, species, direction of motion). These observa-

[1] NATURE, vol. lxxvi., p. 481.

tions lasted at Teplitz Bay from September 1, 1903, to April 30, 1904, and at Cape Flora from May 21, 1904, to July 30, 1905. Taking the mean of the three daily readings, the monthly mean temperature varied at Cape Flora from −19°·9 F. in January to +35°·6 in July; at Teplitz Bay, March had the lowest mean temperature, −19°·7 F. At Cape Flora, the precipitation during the year ending with May, 1905, was equivalent to 21·37 inches of rain. A recording thermograph and barograph were in action at Teplitz Bay from October, 1903, to April, 1904, and a barograph was run at Cape Flora from June, 1904, to May, 1905. From the records of these instruments diurnal inequalities are deduced for individual months, and Fourier coefficients calculated. Taking arithmetic means from individual months, the amplitudes (in thousandths of an inch) of the three first terms in the case of the barometric pressure were :—

	24-hour	12-hour	8-hour
Teplitz Bay (winter)...	14	6	3
Cape Flora (year)	13	5	3

Tidal observations were made at Teplitz Bay from April 1 to June 3, 1904, and at Cape Flora from May 21 to August 31, 1904. Readings, to 0·01 foot, were taken on a tide staff once an hour, usually throughout the whole twenty-four hours. Fig. 2, reproduced from p. 493, shows the arrangements at Teplitz Bay. The wooden frame

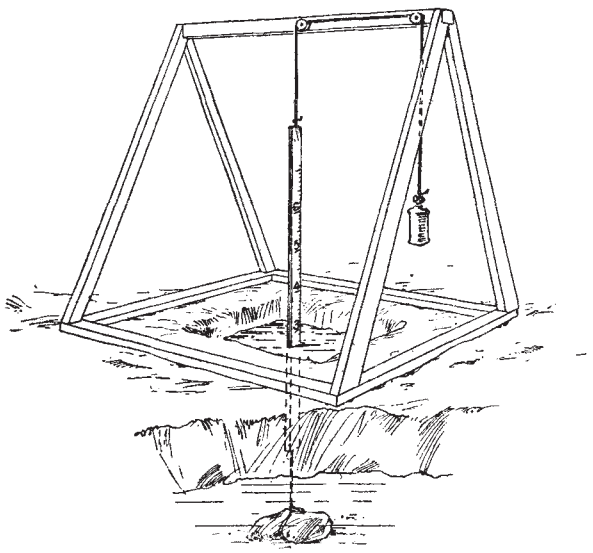

FIG. 2.—Tide Gauge at Teplitz Bay.

rose and fell with the ice it rested on, the heavy stone remaining on the sea bottom. There is an elaborate harmonic analysis of the data, following generally the methods of Sir G. H. Darwin. The mean difference between high-water and low-water level was fairly similar at the two stations, being 1·138 feet at Teplitz Bay and 0·966 foot at Cape Flora. There was, however, a difference of 3½ hours in the "establishment of the port" at the two places, and the conclusion is drawn (p. 596) that the tide from the Atlantic reaches Franz Josef Land by two channels, the deeper, between Spitsbergen and Greenland, chiefly influencing Teplitz Bay, the other, between Spitsbergen and Norway, chiefly influencing Cape Flora.

The astronomical observations served to fix the latitude and longitude of the stations and the azimuths of the declination marks. Considerable care was evidently given to them, but they call for no special remark.

As will have already been inferred, one can have nothing but praise for the zeal displayed. Magnetic observers who took observations at two-minute intervals for eight hours on end, at temperatures below 0° F., cannot be accused of treating Arctic exploration as a pretence for a picnic. It may also be added that no trouble has been spared in making the most of the material collected. Valuable, however, as the results are, they must be accepted with several reservations. As the dates will have shown, the series of observations, especially the tidal ones, were short, and the representative nature of the results is thus exposed to more or less doubt. This consideration cannot but suggest itself to anyone who examines some of the data critically. Taking, for instance, the mean monthly data from the thermograph record at Teplitz Bay, we find that in March the 10 p.m., midnight, and 2 a.m. readings are the only ones of the two-hour readings to *exceed* the mean for the day, the *maximum* coming at 2 a.m.; but in April these are the precise hours to which the lowest temperatures are attached. Again, the diurnal inequality range is 3°·3 in January, in the depth of the Arctic night, but only 0°·8 in October. In the case of the magnetic data, there are other sources of uncertainty. There was appreciable local disturbance both at Teplitz Bay and Alger Island, and its precise effect, though probably not large, cannot be assigned. After the return of the magnetometer to America it was found that a cloth hood, believed to have been fastened to the end of the magnet box in 1899, had been attached with steel tacks. Observations at Cheltenham showed no effect on the declination, but a decrease of 250 γ (1 $\gamma \equiv$ 0·00001 C.G.S.) in the horizontal force. A correction of +255 γ (or nearly 4 per cent.) was thence *calculated* and applied to observations made in the Arctic. In the case of the dip circle comparisons at Cheltenham before the expedition gave for the two needles corrections of only +0′·2 and −0′·3, but the corresponding corrections obtained after the expedition were −4′·1 and −5′·6.

In view of these uncertainties, and the lack of direct information as to diurnal change, the deductions made as to secular changes of horizontal force and inclination at Teplitz Bay by comparison with the results of the Italian observers for 1900 should be regarded with reserve.

Again, at Teplitz Bay there were only nine months' magnetic observations, and the deductions of diurnal inequalities for the three missing months, and thence for the year as a whole, are of somewhat doubtful value.

The deficiencies referred to are such as attach more or less to most expeditions, and there are probably few Polar observations which are not affected by at least as serious uncertainties. There are many points in connection with the observational programme and its execution which merit the attention of those contemplating magnetic or meteorological work in high latitudes. C. CHREE.

SANATORIA FOR CONSUMPTION.

AS a supplement to the thirty-fifth annual report of the Local Government Board, Dr. Bulstrode has published an imposing volume on "Sanatoria for Consumption and certain other Aspects of the Tuberculosis Question." This report, copiously illustrated by photographs, plans, and charts, extends to 700 pages, and is an admirable exposition of the present position of the problem of prevention of tuberculosis.

In part i. is set forth a general review of the changes which have taken place in medical opinion as to the etiology of tuberculosis and as to the mode of its invasion of the human body.

The theory of infection by inhalation of dust infected by dried sputum, and the evidence on which it is based, is reviewed; also the theory of von Behring that infection can be usually traced to the ingestion of tuberculous milk in infancy, remaining latent until some debilitating influence causes the focus of infection to light up to the undoing of the organism. Calmette's theory that direct infection occurs mainly by the ingestion of food tainted by droplets of infective expectoration is also discussed, and finally we have the conclusions of the Royal Commission on Tuberculosis, that a material amount of human tuberculosis is attributable to infection of the intestinal tract by "tubercle of bovine origin."

The proportion of tuberculosis due to this source, unfortunately, has never been definitely ascertained, but the pronouncement of the Royal Commission is important in the light of Koch's dogmatic statements as to the essential difference between human and bovine tubercle, and all this difference entails.